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# Post-Closure Care and Maintenance Plan

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For the Closure of the Cement Kiln Dust Pile  
Metaline Falls, Washington

Prepared for:  
Lehigh Portland Cement Company

July 20, 1995

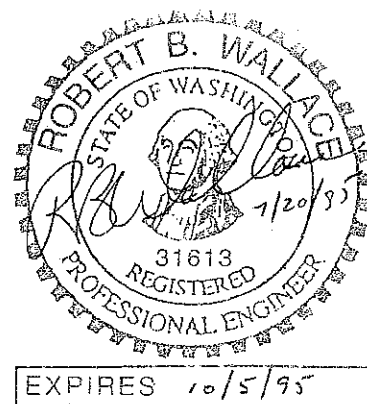


DAMES & MOORE, INC.

Job No. 00691-006-005

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**POST-CLOSURE CARE AND MAINTENANCE PLAN  
FOR THE CLOSURE OF THE  
CEMENT KILN DUST PILE  
METALINE FALLS, WASHINGTON**

**LEHIGH PORTLAND CEMENT COMPANY**

**1.0 INTRODUCTION**

This Post-closure Care and Maintenance Plan (the Plan) has been prepared by the Seattle, Washington office of Dames & Moore, Inc. (Dames & Moore), on behalf of the Lehigh Portland Cement Company (Lehigh) for the closure of a cement kiln dust (CKD) waste pile located in Metaline Falls, Washington.

This Plan addresses those measures that shall be followed in the maintenance and care of the pile after closure. Monitoring requirements are outlined, including the parties associated with that work and the relevant contacts of these parties. Lehigh shall continue to monitor and maintain the integrity and effectiveness of the closure capping system and associated appurtenances for thirty (30) years from the date of closing, unless these requirements are changed at some time by the State of Washington Department of Ecology (Ecology).

**2.0 OWNER OF THE CKD PILE**

The CKD pile was produced as a waste product from a dry processing kiln of a Portland cement production plant owned and operated by Lehigh from 1952 to 1989. It consists of approximately 544,000 tons of CKD, which designates as a Washington State-only dangerous waste by the characteristic of corrosivity (WAC 173-303-090(6)) and the criteria for toxicity (WAC 173-303-100(5)). The CKD pile is an interim status dangerous waste treatment, storage, and disposal (TSD) unit.

After completion of the closure of the CKD pile, Lehigh shall remain the designated owner of the site. The relevant contact address is:

Lehigh Portland Cement Company  
7660 Imperial Way  
Allentown, Pennsylvania 18195

Attention: Mr. Thomas E. Kessler  
(610) 366-4663 direct phone  
(610) 366-4606 fax

Any questions which may arise regarding the CKD pile or the reporting of any site problems should be directed to the designated Lehigh representative, or alternatively, to the Engineer of Record, indicated in Section 3.0 of this Plan.

### 3.0 CLOSURE CAPPING SYSTEM

#### 3.1 CAPPING SYSTEM CONFIGURATION

A closure capping system was designed and constructed to serve as a final containment cover for the CKD pile. The closure cap consists of the following layers, from top to bottom:

- Cement Kiln Dust, is the waste material contained in the pile which requires confinement due to its chemical characteristics. It effectively comprises the bottom layer of the cap cross section and, in fact, because of its relatively low hydraulic conductivity (approximately  $5 \times 10^{-6}$  cm/sec), serves as a low permeability soil layer and as a bottom component of a GCL/CKD composite liner.
- Geosynthetic Clay Liner (GCL), comprises the barrier layer (located directly above and in intimate contact with the CKD), which has been designed as a stand-alone liner, although as noted above, the CKD has sufficiently low hydraulic conductivity (permeability) that the two layers combined will act as a composite liner. GCLs consist of bentonite soils sandwiched between two geotextiles, which are needlepunched or stitched to form a stable network.
- Drainage Geotextile, used as a combined protective cushion layer and transmissive drainage layer, located directly above and in contact with the GCL.
- Reinforcement Geotextile, a reinforcing geosynthetic used to protect the GCL and prevent sliding of the cover soils down steep slopes. The Reinforcement Geotextile will be incorporated within the cover layer on the slopes only, to prevent the transfer of downdrag loads from the cover soil to the barrier layer.
- Cover Soil, consisting of locally excavated soils, placed and compacted above the geotextile, to provide protective cover and insulation, and to inhibit infiltration of precipitation to the capping system.
- Topsoil, placed immediately above the cover soil, designed to provide vegetative support, critical for long term stability of the capping system, in particular on steep slope sections.

This capping system was installed in accordance with the detailed plans and specifications prepared by the Engineer of Record, on behalf of Lehigh.

### 3.2 ENGINEER OF RECORD

The Engineer of Record, responsible for the design and construction of the closure capping system of the CKD pile, is as follows:

Dames & Moore, Inc.  
2025 First Avenue, Suite 500  
Seattle, Washington 98121

Attention: Mr. Robert B. Wallace, P.E.  
(206) 728-0744 phone  
(206) 727-3350 fax

Dames & Moore was responsible for the preparation of the closure capping system design, as well as the oversight on the construction of the pile. Any questions or issues which may arise with regard to the design or implementation during construction should be addressed by Dames & Moore, through Lehigh.

### 4.0 POST-CLOSURE CARE AND MAINTENANCE REQUIREMENTS

#### 4.1 SPECIFIC REGULATORY REQUIREMENTS

The post-closure requirements for the CKD pile conform to the requirements prescribed by the Washington Department of Ecology Dangerous Waste Regulations (Chapter 173-303 WAC), specifically, WAC 173-303-610, Subsections 7 through 11; and WAC 173-303-665, pertaining to post-closure care and use of the property.

In particular, the following requirements shall be met, throughout the period from completion of closure, continuing until the end of the post-closure care period:

- "ground water monitoring and reporting as applicable" (WAC 173-303-610(7)(a)(i)) - monitoring of groundwater shall be carried out every three months, with annual reporting to Ecology; and
- "maintenance and monitoring of waste containment systems as applicable" (WAC 173-303-610(7)(a)(ii)) - an inspection of the site shall be carried out quarterly, at the time of the groundwater monitoring, and any deficiencies or problems shall be investigated and remedied as required.

## 4.2 REGULATORY AGENCY

The closure of the CKD pile has been overseen by the Spokane Regional office of the State of Washington Department of Ecology. The relevant contact is:

Department of Ecology  
Eastern Regional Office  
4601 N. Monroe, Suite 202  
Spokane, WA 99205-1295

Attention: Mr. Keith L. Stoffel, Hydrogeologist  
(509) 456-3176 phone

## 4.3 DURATION OF CARE AND MAINTENANCE

The primary purpose of the post-closure care and maintenance period is to protect human health and the environment. The standard duration of the post-closure care and maintenance of the facility is 30 years after completion of the closure. The prescribed 30-year period may be modified by Ecology, in accordance with WAC 173-303-610(7)(b)(i) if "it finds that the reduced period is sufficient to protect human health and the environment (e.g., leachate or ground water monitoring results, characteristics of the dangerous waste, application of advanced technology, or alternative disposal, treatment, or reuse techniques indicate that the dangerous waste management unit or facility is secure)". At this site, such a provision would likely be triggered by the results of the groundwater monitoring, upon completion of testing determining "clean" levels of contaminants.

## 4.4 FUTURE LAND USE

The post-closure land use of the CKD pile has not been specified. In view of the present needs of the local community, it has been assumed that the site will not have any planned land use throughout the care and maintenance period. Should any planned use arise during the post-closure period, Lehigh shall ensure that the proposed land use does not disturb the integrity of the cap or the functioning of the monitoring systems. Any future land use at the site shall require the permission and approval of Lehigh and ensure that the use does not present any threat to human health and the environment. Any unplanned (unauthorized) use of the property will be discouraged. Nevertheless, the closure of the CKD pile has incorporated provisions to protect the integrity of the final cover and other components of the containment system, in addition to the monitoring systems present on site, in conformance with WAC 173-303-610(7)(d).

#### **4.5 POST-CLOSURE PLAN**

WAC 173-303-610(8) requires a Post-closure Care and Maintenance Plan. This document (the Plan) meets the requirements of this section. This section of the regulation also contains a provision for modification of the Plan by Lehigh, subject to review and approval by Ecology, during the post-closure period.

#### **4.6 NOTICES TO LOCAL LAND AUTHORITY**

##### **4.6.1 Notice to Local Land Authority**

Upon completion of the certification of closure of the CKD pile, Lehigh submitted to local land use authority, with a copy to Ecology, a survey plat showing the location and dimensions of the closed facility, with respect to permanently surveyed benchmarks, prepared and certified by a registered land surveyor in the State of Washington, in conformance with WAC 173-303-610(9). The relevant contact address is:

Land Use Authority  
c/o Lafarge Corporation  
P.O. Box 157  
Metaline Falls, WA 99153

Attention: Mr. Carl McKenzie  
(509) 446-3101 phone  
(509) 446-4712 fax

This survey plat has been appended to this Post-closure Care and Maintenance Plan, within Appendix A.

##### **4.6.2 Notice in Deed to Property**

In addition to the survey plat, a similar survey plan has been submitted, indicating to the best of Lehigh's knowledge and available records, the location of the CKD waste within the pile, in accordance with WAC 173-303-610(10). This plan is also contained within Appendix A.

#### **4.7 CERTIFICATION OF COMPLETION OF POST-CLOSURE CARE**

Upon completion of the 30-year post-closure care and maintenance period (or revised duration if authorized by Ecology per WAC 173-303-610(7)(b)(i)), Lehigh shall submit to Ecology, within 60 days, a certification by a (third party) professional engineer registered in the State of Washington, that the post-closure care and maintenance was performed throughout the required period, in conformance with this Plan, as approved by Ecology (WAC 173-303-610(11)). Upon satisfaction of this submittal with appropriate documentation, Ecology shall release Lehigh from the financial assurance requirements for post-closure care as contained in WAC 173-303-620(6).

## 5.0 GROUNDWATER MONITORING

### 5.1 DESIGNATED MONITORING CONSULTANT

A program of groundwater monitoring has been established with monitoring being completed on a quarterly basis. The responsible consultant for the groundwater monitoring, being performed on behalf of Lehigh, is:

Dames & Moore, Inc.  
2025 First Avenue, Suite 500  
Seattle, Washington 98121

Attention: Ms Melody Allen  
(206) 728-0744 phone  
(206) 727-3350 fax

Dames & Moore shall provide on-site monitoring in accordance with the requirements presented in Section 4.2 of this Plan. In addition to the monitoring activities, visual inspections of the condition of the closed facility will be performed at the same time as field monitoring.

### 5.2 GROUNDWATER MONITORING

Groundwater monitoring has been carried out on a continuing basis throughout the investigation of the CKD pile, and throughout the design and implementation of the closure plan. This monitoring shall continue throughout the post-closure period, on a quarterly basis, with the results of the monitoring program being reported to the Spokane, Washington office of Ecology on an annual basis. Monitoring shall be performed, either throughout the post-closure care period, or until contamination readings fall below threshold levels and Ecology agrees to either a reduced scope or frequency of monitoring, or termination of the monitoring program altogether.

The monitoring points at the site are represented on Figure 3 from the Closure Plan, presented for reference within Appendix B of this Plan. Typical (example) readings and testing performed on samples from these monitoring points, illustrating the format of presentation, are presented on Table 11 from the Closure Plan for the site, also presented for reference in Appendix B of this Plan.

In particular, monitoring shall include the following:

- Quarterly (every three months) examination of all groundwater monitoring wells at the site, noting groundwater levels, and measuring the specific conductivity and temperature of the water shall be carried out. This includes monitoring wells MW-3A, MW-4, MW-5, MW-7, MW-8, MW-9, and MW-10. Previously existing monitoring wells MW-1, MW-2, MW-3, MW-6, and MW-11 were abandoned by the construction of the closure cap, as they were all located within the footprint of the CKD pile. The locations of all of these monitoring wells are illustrated on Figure 3 from the Closure Plan, presented in Appendix B of this Plan.
- Collection of groundwater samples from each monitoring well, for laboratory analysis.
- A visual examination and condition survey of all slopes, drainage channels, and the general condition of the cap. Any areas requiring maintenance or repair shall be noted and appropriate action taken.
- Performance of laboratory testing on groundwater samples, for the following characteristics: pH and total metals (i.e., arsenic, aluminum, cadmium, chromium, lead, mercury, selenium, silver, iron, copper, zinc, nickel, antimony, and iron), using the USEPA SW-846 methods and procedures; and alkalinity, using Standard Method 403.

These data shall be analyzed and reviewed by Dames & Moore. Evaluation of and reporting on all findings after each monitoring cycle, with formal reporting of all data to Ecology at the end of each year of post-closure monitoring will be provided.

## **6.0 FACILITY MAINTENANCE**

Maintenance of the closed CKD pile during the post-closure period shall be performed to meet the requirements of WAC 173-303-610(8)(b)(ii) and WAC 173-303-665(6).

### **6.1 MAINTENANCE OF SITE VEGETATION**

The closure of the CKD pile has provided for the development of a permanent vegetative cover as the upper component of the capping system. During the initial grow-in period of the vegetative seeding conducted during the capping operations, Lehigh shall, with the contractor responsible for the closure implementation, frequently examine the vegetation for progress in the growth. If there are gaps in the growth of the vegetation or failure of the vegetation, reapplication of the seeding shall be carried out to ensure complete vegetative cover throughout the area of the pile. Appropriate measures shall also be taken during the post-closure period if the quarterly examinations or maintenance operations indicate areas of denudation for any reason, which could contribute to erosion.

Once the vegetation has been firmly established and has matured, the maintenance of this vegetation shall commence. The grasses planned for the vegetative cover are of a nature that limited height will be attained, on the order of 12 to 14 inches. It is, therefore, planned to allow the vegetation to remain at that mature height on at least the sideslopes of the pile. This will minimize the maintenance required, and will provide an ancillary benefit of impeding the velocity of flow of precipitation downslope and thereby resisting erosion of the slope. On the top of the pile, however, periodic (as-required) mowing of the flatter top area will be arranged with a local maintenance contractor, to maintain a groomed appearance and preserve proper drainage to the stormwater channels during precipitation.

At the time of grass mowing, the maintenance contractor shall also clean and clear the bench and perimeter stormwater management channels of accumulated debris, litter, and/or siltation as may accumulate from time to time, in order to ensure that the designed run-on diversion, and run-off provisions discharge properly to the drainage course and the culverts beneath Highway 31.

## **6.2 EROSION PROTECTION**

The capping system for the CKD pile has been designed to minimize the potential for deterioration of the cap as a result of surface erosion. The primary cause of this erosion is precipitation and associated run-off. Precipitation at the site consists of both rain and snow. The provision of a permanent vegetative grass cover to the cap will retard any erosive forces which arise due to precipitation and run-off. In addition, grading of the pile has been carried out to minimize the quantities of water available to contribute to erosion. In particular:

- The perimeter stormwater management system has been designed to eliminate run-on to the surface of the closed CKD pile from off-site precipitation sources. Drainage ditches to carry off-site run-off have been constructed around the pile to appropriate discharge points. This also serves to considerably reduce the potential infiltration component of precipitation.
- Velocity is a significant component of the erosive factors of run-off. The steep sideslopes of the pile are susceptible to erosion due to fast-moving water from rainfall and snowmelt, and from wind. By the allowance of denser and higher vegetation on these slopes, the velocity of run-off shall be impeded.
- The quantity of run-off down the steep sideslopes has been restricted considerably. Site grading has been provided in such a manner that run-off from the relatively flat upper portion of the pile directed over the crest to the steep sideslopes is travelling at such a low velocity that it will quickly be assimilated into the heavily vegetated sideslopes.
- A drainage interceptor channel has been provided on the intermediate bench, designed to remove all direct run-off from the top section of the slope, thereby limiting the run-off

on the top and bottom portions of the slope to that precipitation directly falling on each segment.

- Positive surface gradients have been provided on the top of the pile, directing run-off to either GCL-lined grassy swales tied-in to the stormwater management system or down the steep sideslopes to either be assimilated by heavy slope vegetation or collected by the intermediate bench stormwater management system.

### **6.3 MINIMIZATION OF INFILTRATION**

WAC 173-303-665(6) requires that throughout the post-closure period, the infiltration of surface water through the cap to the CKD material be minimized. Maintenance of the integrity of the capping system, including the vegetative cover will also provide the benefit of inhibiting any infiltration, but with the design components of a drainage medium above the barrier, as well as the GCL barrier itself, the intrusion of any infiltration to the CKD waste is unlikely. Any surficial infiltration of precipitation into the upper layers of the capping system will in large part be absorbed by the grasses in addition to any evaporative effects.

### **6.4 STORMWATER MANAGEMENT**

Maintenance of the stormwater management facilities associated with the closure of the CKD pile will assure that run-on to the surface of the closed CKD pile from off-site sources is virtually eliminated, thus greatly decreasing the potential for erosion of the cap. Components of the stormwater management system shall be periodically inspected for damage or clogging. In addition, cleaning of debris, litter, and/or siltation of the channels and culverts will be completed, as required, at the time of the periodic grass-cutting activity.

### **6.5 REPAIRS**

Any damage to the capping system or stormwater management facilities due to erosion, instability, earthquake or other natural disaster, vandalism, animals, or any other cause shall be repaired as soon as it is detected. These repairs shall be performed as a component of the ongoing care and maintenance of the facility. Repairs shall be carried out using the same types of materials as were damaged or destroyed, in accordance with the guidance and instructions of the design engineer (the Engineer of Record) for the capping system.

If any monitoring wells or other devices required by the monitoring program are damaged or destroyed for any reason, Lehigh shall inform Ecology, and if determined to be essential to the monitoring program, the damaged device shall be repaired or replaced.

## 7.0 SUMMARY AND CLOSURE

This Post-closure Care and Maintenance Plan outlines the requirements of the post-closure period and the measures that will be followed by Lehigh to meet these criteria. Every effort shall be applied to preserve the integrity and safety of the closed CKD pile. Any problems or damages which may arise shall be remedied in accordance with the instructions of the design engineer and good engineering and construction practices. Monitoring of the groundwater will continue throughout the post-closure period in accordance with this plan and the requirements of Ecology.